

[What is claimed is:

B2 2) The solid diamond electron emitter of claim 18 wherein said point has a surface roughness below about 10 angstroms.

5 3) The solid diamond electron emitter of claim 18 wherein said radius is less than about 10 μ m.

10 4) The solid diamond electron emitter of claim 18 wherein said radius ranges from about 3 angstroms to about 3 μ m.

B3 5) The solid diamond electron emitter of claim 18 further including a conductive shank to which said diamond is adhered.

15 11) The solid diamond electron emitter of claim 10 wherein said diamond is adhered to said conductive shank by a vapor deposited layer of palladium or titanium.

20 7) The solid diamond field emitter of claim 10 wherein said radius is less than about 10 μ m.

B4 8) The solid diamond electron emitter of claim 10 wherein said radius ranges from about 3 angstroms to about 3 μ m.

14) The solid diamond electron field emitter of claim 10 wherein said point is produced using a non-contact machining technique.

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15) The solid diamond electron emitter of claim 14 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.

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18) A solid diamond electron emitter comprising a diamond greater than $5\mu\text{m}$ in thickness having a pointed surface with a radius of less than about $100\mu\text{m}$, said pointed surface having a roughness of between about 20 angstroms and about $10\mu\text{m}$.

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19) A field emitter extractor gauge comprising a field emitter array, an anode grid, a focus plate, a reflector and a collector wherein said field emitter array comprises an array of solid diamond electron emitters each comprising a diamond greater than $5\mu\text{m}$ in thickness having a pointed surface with a radius of less than about $100\mu\text{m}$, said pointed surface having a roughness of between about 20 angstroms and about $10\mu\text{m}$.

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